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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/051,984	01/15/2002	Michael Richard Ehlert	NSC1P202/P04892	1583

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EXAMINER

PATEL, ISHWARBHAI B

ART UNIT	PAPER NUMBER
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2827

DATE MAILED: 11/21/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/051,984

Applicant(s)

EHLERT ET AL.

Examiner

Ishwar (I. B.) Patel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 20-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 January 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-19, drawn to a ceramic circuit structure, classified in class 174, subclass 256.
 - II. Claims 20-24, drawn to a method for manufacturing a ceramic circuit structure, classified in class 29, subclass 846.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions group II and I are related as process of making and product made.

The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by another and materially different process such as the steps of aligning the ceramic material layer or co-firing the stacked ceramic material are not needed in the product.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, and the search required for Group II is not required for Group I, restriction for examination purposes as indicated is proper.

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4. During a telephone conversation with Phillip Lee (Reg. No. 48,866) on April 12, 2002, a provisional election was made without traverse to prosecute the invention of a ceramic circuit structure, group I, claims 1-19. Affirmation of this election must be made by applicant in replying to this Office action. Claims 20-24 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Drawings

6. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the ring of dielectric material partially embedded within the surface of the first ceramic layer as claimed in claim 4, 13 and 17, ceramic structure mounted on a printed circuit board as claimed claim 5, 12 and 18, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

7. The drawings are objected to because the figures are improperly cross hatched. The cross hatching patterns should be selected from those shown on page 600-81 of the MPEP based on the material of the part. See also 37 CFR 1.84(h)(3) and MPEP 608.02. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakami et al., US Patent No. 5, 847,326, hereafter Kawakami, and further in view of Tanifuji et al., US Patent No. 5,627,344, hereafter Tanifuji.

Regarding claim 1 and 15, Kawakami discloses a circuit structure having plurality of ceramic layers, wherein a first one of the ceramic layers comprises:

a through hole that passes through the first ceramic layer, the through being filled with a first electrically conductive material, which forms a via (through hole 13 in a ceramic layer 12 and filled with conductive paste of Ag, see figure 1, column 2, line 58 to column 3, line 10);

a contact pad formed from a second electrically conductive material that is different from the first electrically conductive material (pattern of Au surface layer wiring conductors 17, see figure 1, column 3, line 10-20);

a barrier cap formed in contact with and between the via and the contact pad, the barrier cap being formed from a third electrically conductive material that is different from the first and second electrically conductive material (Au/Ag intermediate metal layer, see figure 1, column 3, line 10-20); except

a dielectric ring covering a peripheral portion of the contact pad and an adjacent portion of the dielectric material layer surface immediately surrounding the contact pad, such that any solder that is applied to the contact does not contact the peripheral portion of the contact pad or the ceramic material. However, such coating of solder mask or resist is known in the art for protecting the outer surface for environmental degradation, such as glass coating 22 used for covering the resistor 21, see figure 1, and for avoiding short circuit between the contact pad. Therefore, it would have been

obvious to one having ordinary skill in the art at the time the invention was made to provide the structure of Kawakami with suitable coating on the pad in order to protect the top surface and to avoid short circuit between the adjacent contact pads.

Regarding claim 8, Kawakami discloses all the features of the claimed invention as applied to claim 1 above except the catch pad. However, such design of providing additional layer for firm bonding is known in the art. Tanifuji discloses one such additional layer for better bonding; see Tanifuji figure 2, intermediate layer 4, column 5, line 20-50. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the structure of Kawakami with the catch pad in order to have firm bonding.

Regarding claim 2 and 10, Kawakami further discloses the barrier cap prevents the first electrically conductive material within the through hole from making contact with the second electrically conductive material from forming the contact pad, see figure 1.

Regarding claim 3, 11 and 16, as applied to claim 1 above, the dielectric material is glass.

Regarding claim 4 and 17, though Kawakami does not disclose, the dielectric material partially embedded within the surface of the first ceramic layer, it will depend upon the design of the via hole and the contact pad and the specific requirement, such

as to cover the contact pad periphery only or to cover the whole surface of the ceramic layer. If whole surface is to be covered, it will be on the surface and not embedded.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the structure of Kawakami with dielectric material partially embedded in order to just cover the periphery of the contact pads only instead of the whole surface of the ceramic layer.

Regarding claim 5, 12 and 18, Kawakami does not explicitly disclose the circuit structure is mounted on printed circuit board, it is common to have the structure installed on the printed circuit board such as mother board for interconnection of the device with other component in the assembly such as for power or signal connections. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the structure of Kawakami installed on a printed circuit board in order to interconnection with other component of the assembly.

Regarding claim 6, 13 and 19, though Kawakami does not disclose the contact pad embedded into the surface of the ceramic layer, such design is known in the art to just expose the pad for connection and not the conductor pattern to have better control of the short circuit without even additional mask or resist. Further this design of embedding the contact pad will provide a better planar surface for electrical connection. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the structure of Kawakami with contact pad

embedded in the ceramic layer in order to have better planner surface for external connection.

Regarding claim 7 and 14, though Kawakami is disclosing three different materials for via hole, intermediate / barrier cap and contact pad, not discloses explicitly as claimed by the applicant. However, the crux of providing an intermediate layer is to have a better contact of via hole material with the contact pad and any suitable combination can be used to have the better and reliable continuity. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the structure of Kawakami with combination of materials as claimed in order to have better and reliable electrical continuity.

Regarding claim 9, the modified assembly of Kawakami further discloses a dielectric ring as applied to claim as applied to claim 1 above.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Branchevsky, Shepherd, Traskos et al., Bohrer et al., Takagi et al., Beck et al., Haq et al., Dohya, and Kim et al., disclose the circuit structure similar to applicant's claimed invention.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ishwar (I. B.) Patel whose telephone number is (703) 305 2617. The examiner can normally be reached on M-F (6:30 - 4) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L Talbott can be reached on (703) 305 9883. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305 3431 for regular communications and (703) 305 7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 0956.

ibp
November 17, 2002

Albert W. Paladini 11-18-02

ALBERT W. PALADINI
PRIMARY EXAMINER